REMARKS

In the Action, claims 1-4 are rejected, and claim 5 is withdrawn from consideration as being directed to the non-elected invention.

In response, claim 1 is amended to clarify the features of the invention in response to the rejection under 35 U.S.C. § 112, first paragraph. As readily recognized by one of ordinary skill in the art, the monomer liquid being in a stirred state in the supply pipe line is inherently downstream of the stirring apparatus. The stirring apparatus inherently stirs the liquid both in the stirring apparatus and downstream of the stirring apparatus. Claim 1 is amended to clarify that the monomer liquid is in a stirred state downstream of the stirring apparatus. Support for this feature is found on page 14, lines 8-22 of the specification.

In view of these amendments and the following comments, reconsideration and allowance are requested.

Rejection Under 35 U.S.C. § 112

Claim 1 is rejected under 35 U.S.C. § 112, first paragraph, as not complying with the enablement requirement. The basis for this rejection on page 2 of the Action is unclear. The specification and the drawings clearly disclose a stirring apparatus in the flow pipe to induce a stirred state in the monomer liquid.

Furthermore, page 4, paragraph 8, of the Action appears to recognize that the specification and Examples disclose a stirring apparatus to produce a stirred monomer liquid, and thus, support the prior amendments. The bottom of page 4 of the Action recognizes that the stirring apparatus produces the stirred state in the supply pipe line. The Action appears to mischaracterize the invention as claimed by suggesting that the claimed invention produces a stirred state of the monomer liquid upstream of the stirring apparatus. Claim 1 recites the

stirring apparatus in the supply pipe line to produce a stirred state in the supply pipe line. Claim 1 does not require the stirred state of the monomer liquid to exist throughout the entire length of the supply pipe line and does not require the stirred state of the monomer liquid to be upstream of the supply pipe line as apparently suggested in the Action. Such a claim interpretation is inconsistent with the normal interpretation of the language of claim 1. Claim 1 only recites that the monomer liquid is continuously passed through the supply pipe line.

In view of the above comments, the claims are enabled by one of ordinary skill in the art. However, to advance the prosecution, claim 1 is amended to clarify that the stirred state of the monomer liquid is downstream of the stirring apparatus and to obviate this rejection.

Rejection Under 35 U.S.C. § 103

Claims 1-4 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 3,988,509 to Ballard et al. in view of U.S. Patent No. 6,252,016 to Wu et al. Ballard et al. is cited for disclosing a process for producing polymers by introducing a free radical initiator into a polymer stream. Ballard et al. does not disclose a supply pipe line having a stirring apparatus or producing a monomer liquid in a stirred state while continuously passing the monomer liquid through the supply pipe line as claimed. Wu et al. is cited for disclosing polymerization in a non-cylindrical channel where the polymer emulsion is premixed in a mixing apparatus prior to introducing to the channel.

The present invention is directed to a process for producing a water-absorbent resin. Claim 1 recites continuously supplying a monomer liquid to a supply pipe line having a stirring apparatus so that the monomer liquid is in a stirred state downstream of the stirring apparatus and joining a polymerization initiator into the monomer liquid while in the stirred state to obtain a mixed liquid of the monomer and polymerization initiator which is then

continuously supplied from the supply pipe line to a polymerization apparatus. The art of record either standing alone or in combination does not disclose the combination of these features.

Ballard et al. is directed to a process for producing reduced melt index and low gel content ethylene copolymers. Ballard et al. does not disclose or suggest a process for producing water-absorbent resins as in the claimed invention. Furthermore, Ballard et al. does not disclose a stirring apparatus in a supply pipe line to produce a monomer liquid in a stirred state or introducing the initiator into the supply pipe line to mix with the monomer while in a stirred state.

Ballard et al. corresponds substantially to Comparative Example 1 of the specification. Ballard et al. passes the monomer through line 3 to the reactor 5. There is no suggestion in Ballard et al. of a stirring apparatus in the line 3. As noted in the Action, a liquid monomer passing through a line in the absence of a stirring apparatus is not stirred and is not a "turbulent flow". Ballard et al. introduces the initiator through line 4 immediately upstream of the reactor 5. Accordingly, the initiator of Ballard et al. is not introduced into the monomer liquid while in a stirred state.

Comparative Example 1 in the specification was carried out without the use of a stirring apparatus in the supply pipe line. The polymerization initiator was added to the flow without the use of a stirring apparatus in the same manner as in Ballard et al. Thus, Ballard et al. corresponds to Comparative Example 1. The data in Table 1 on page 22 of the specification and as described on page 22, lines 13-28 of the specification, demonstrate the improved results by the process of the claimed invention. Comparative Example 1 produced a polymer having a higher extractable content and higher amount of residual monomer compared to the process of the claimed invention. Furthermore, Comparative Example 2,

which also did not have a stirring apparatus of the supply pipe line, resulted in clogging caused by the polymer so that the process could not be carried out continuously for extended periods of time.

Example 1 of the specification, which corresponds to the claimed invention, introduced the initiator into the stirred state of the monomer liquid, and thereafter, introduced the stirred flow of the monomer liquid and initiator into the reactor to produce a polymer. The resulting polymer had a lower extractable content and lower amount of residual monomer than the polymer produced by the process of Comparative Example 1.

Page 5 of the Action refers to the Reynolds number and the turbulent flow as determined by the Reynolds number. Claim 1 recites the monomer liquid being in a <u>stirred state</u> and does not recited a "turbulent flow" as apparently suggested in the Action. Thus, the claims do not recite "a turbulent flow" as the term is defined according to the Reynolds number.

Furthermore, claim 4 recites the stirred monomer liquid having a "stirring Reynolds number" not smaller than 50. Claim 4 does not recite a "turbulent flow" as apparently suggested in the Action. The "stirring Reynolds number" of the invention is not the same as the "Reynolds number" referred to in the Action. The "Reynolds number" discussed in the Action and the cited dictionary refers to the evaluation of the liquid flow through a pipe according to standard procedures. The "stirring Reynolds number" discussed in the specification is for evaluating the flow state of the liquid to which the stirring operation is applied. Each method is calculated differently to that the "stirring Reynolds number" does not correspond to the "Reynolds number" referred to in the Action. The calculated "stirring Reynolds number" of 2,280 in Example 1 of the specification is not the same as the "Reynolds number" mentioned in the Action.

It is irrelevant whether or not the claimed stirring Reynolds number is a "turbulent flow" as defined by the dictionary definition since the method determining the Reynolds number of the dictionary is different from the claimed stirring Reynolds number. Accordingly, the dictionary definition of "turbulent flow" relied on by the Action is irrelevant to the claimed invention. The claims only recite a stirred state and do not require a "turbulent flow" according to the definition relied on in the Action. A stirring Reynolds number of not smaller than 50 is a <u>stirred</u> state within the meaning of the claimed invention

As discussed above, the stirring Reynolds number as recited in the claims does not correlate to the Reynolds number of the cited in the Action. As noted on page 10 of the specification and the Examples, the flowing state of the liquid in the supply pipe line is evaluated by schematically adapting the stirring Reynolds number to represent the flowing state as stirred by the stirring apparatus. Furthermore, this passage on page 10 refers to the stirring Reynolds number below 50 being a laminar flow and a stirring Reynolds number greater than 1000 is considered a turbulent flow state. Thus, the stirred state of the present invention generally falls between at least 50 and less than 1000. No where in the specification or the claims is the stirred state of the monomer liquid referred to a "turbulent flow" based on a minimum stirring Reynolds number. The stirred state as claimed is not necessarily a "turbulent" flow according to the discussion on page 10 of the specification. Page 14, line 21 of the specification refers to a "vortical" flow. Thus, the comments in the Action regarding the stirring Reynolds number and turbulent flow are irrelevant to the claimed invention.

Wu et al. also does not disclose mixing an initiator in a monomer stream where the monomer stream is in a stirred state. Thus, Wu et al. provides no motivation or incentive to modify the process of Ballard et al. Wu et al. discloses feeding the initiator into a mixing

apparatus and forming a stable emulsion. The resulting emulsion is then delivered to a supply pipe line to the reactor. Thus, the emulsion is formed before feeding to the pipe line. The reactor is the non-cylindrical channel illustrated in Wu et al. Wu et al. does not suggest introducing an initiator into a stirred monomer liquid in a flow pipe line. Thus, it would not have been obvious to one of ordinary skill in the art to modify Ballard et al. in the manner suggested in the Action.

Example 1 of Wu et al. in column 7, lines 52-55 state that they use a static mixer to stir the catalyst including the initiator, activator solution, and monomer emulsion. Comparative Example 2 on page 22 of the present specification specifically discloses the use of a static mixer. Thus, Comparative Example 2 of the specification substantially corresponds to Wu et al. in contrast to the assertion in the Action. As disclosed in the specification and the Examples, the process of the claimed invention provides improved results over Comparative Example 1 and Comparative Example 2.

The Action again refers to the vessel of Wu et al. as being the same as the claimed supply pipe line. Regardless of the dictionary definition of a "vessel", the vessel of Wu et al. is clearly not a supply pipe line. Furthermore, the vessel of Wu et al. is disclosed as an emulsion forming tank including a stirring apparatus and not a pipe. In particular, the Examples of Wu et al. expressly refer to an emulsion tank including a magnetic stirring bar. The resulting emulsion is contained in a feed tank. Example 1 also refers to a premixer to form the stable monomer emulsion and a static mixer to mix the catalyst and activator solutions with the monomer emulsion. Thus, the emulsion tank and reactor of Wu et al. is not a supply pipe line as claimed having a monomer liquid continuously passing therethrough. Furthermore, the emulsion tank and reactor of Wu et al. does not have a mixing apparatus to

form the monomer liquid in a stirred state downstream of the apparatus or introducing an initiator into the monomer liquid in a stirred state.

The Action again refers to the dictionary definitions of a "vessel" but has failed to establish that Wu et al. intended the term "vessel" to refer to a supply pipe line. Thus, regardless of whether the Action is able to locate a dictionary definition which refers to blood vessels, this does not establish that Wu et al. intends the emulsion tank to be a flow pipe or supply pipe line as in the present invention. As noted above, Wu et al. specifically mixes the monomer liquid in an emulsion tank to produce a monomer emulsion.

Claim 1 does not refer to a monomer emulsion as in Wu et al. Furthermore, Ballard et al. also fails to disclose a monomer emulsion. Thus, Wu et al. provides no motivation or incentive to modify the process of Ballard et al. The combination of Wu et al. and Ballard et al. would not result in a process of introducing a polymerization initiator into a monomer liquid in a stirred state while the monomer liquid is passing through a supply pipe line. Accordingly, claim 1 would not have been obvious to one of ordinary skill in the art over Ballard et al. in view of Wu et al.

Claims 2, 3 and 4 are also not obvious over the cited art. Ballard et al. and Wu et al. do not disclose or suggest the monomer liquid having a concentration of not less than 40 weight % as in claim 2, or the monomer liquid having a temperature of not lower than 50° in the supply pipe line. In particular, claim 3 depends from claim 1 and recites that the monomer liquid while being continuously stirred has a temperature of not lower than 50° when the polymerization initiator is introduced into the stirred monomer liquid. Ballard et al. and Wu et al. do not disclose a continuously stirred monomer liquid in a supply pipe line, and thus, do not disclose or suggest the claimed temperature. Wu et al. and Ballard et al. further fail to disclose a monomer liquid in a supply pipe line having a Reynolds number of not less

than 50 and introducing a polymerization initiator into the monomer liquid in the stirred state as in claim 4.

In view of the above comments, claims 1-4 are not obvious over the combination of Ballard et al. and Wu et al. Thus, reconsideration and allowance are requested.

Respectfully submitted,

Garrett V. Davis
Reg. No. 32,023

Roylance, Abrams, Berdo & Goodman, L.L.P.
1300 19th Street, N.W., Suite 600
Washington, D.C. 20036-1649
(202) 659-9076

Dated: Oct 2, 2006